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Working Hard For You

nder the Safe Drinking Water Act, the U.S. Environmental

Protection Agency is responsible for setting national limits for hundreds of substances in drinking water and also specifies various treatments that water systems must use to remove these substances. Each system continually monitors for these substances and reports to the EPA if they were detected in the drinking water. The EPA uses these data to ensure that consumers are receiving clean water.

This publication conforms to regulations under the Safe Drinking Water Act requiring water utilities to provide detailed water-quality information to each of their customers annually. We are committed to providing you with this information about your water quality because customers who are well-informed are our best allies in supporting improvements necessary to maintain the highest drinking-water standards.

During 2002, and in years past, the service area of the Appomattox River Water Authority has experienced discolored water caused by manganese. Naturally occurring manganese in Lake Chesdin is passing through the ARWA plant at low levels, accumulating in water mains and sporadically releasing to create discolored-water events. ARWA has responded to this issue with treatment process improvements scheduled to be completed in 2005. Although manganese-discolored water is not considered a health concern, we realize the inconvenience these occurrences are to our customers and will continue to work with the ARWA until permanent processes are in place.

For more information about this report, or to ask questions relating to your drinking water, please call Wendy Harding, quality assurance coordinator, at (804) 744-1360.

Substances Expected to be in Water Sources

he sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it can acquire naturally occurring minerals, in some cases radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Substances that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, which may come from wastewater treatment plants, septic systems, agricultural livestock operations or wildlife.

Inorganic Contaminants, such as salts and metals, which can be naturally occurring or may result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and Herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and may also come from gas stations, urban stormwater runoff and septic systems.

Radioactive Contaminants, which can be naturally occurring or may be the result of oil and gas production and mining activities.

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency prescribes regulations limiting the amount of certain contaminants in water provided by public water systems. U.S. Food and Drug Administration regulations establish limits for contaminants in bottled water that must provide the same protection for public health. Drinking water,

including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at (800) 426-4791.



How Is My Water Treated And Purified?

The treatment process consists of a series of steps. In the first process, coagulation, the addition of ferric sulfate causes small particles in the water to adhere to one another and grow in size. In the next process, flocculation, the water is slowly stirred, causing particles to grow even larger. The water then passes into a settling basin where the large, heavy particles settle to the tank bottom for removal. The water is then disinfected using chlorine. Lime is added at this point to neutralize the water and make it less corrosive. The water then passes through sand and anthracite filters to remove particles not removed by settling. Just prior to distribution, the water is again disinfected using chloramine. As an additional value, fluoride is added to the finished drinking water for dental protection.

What's My Water Source?

hesterfield County Utilities Department customers are fortunate because their water is supplied by three sources. These sources assure water supply well into the 21st century. The three sources that supply Chesterfield County's potable water are Swift Creek Reservoir, Lake Chesdin and the James River. An average of 36.2 million gallons of water per day was treated and delivered from these three water supplies in 2002.

The Department of Utilities owns and operates the Addison-Evans Water Production and Laboratory Facility and is located on Swift Creek Reservoir. This facility has a capacity of 12 MGD and produced an average of 6.4 MGD. The county is one of five members of the Appomattox River Water Authority. The ARWA is located on the northern side of Lake Chesdin. The county has a daily allocation of 24.54 MGD from the authority and received an average of 16.7 MGD from this facility. The third water source is the James River, which supplies the treatment facility owned and operated by the city of Richmond. This plant supplies water to Richmond and the counties of Henrico, Goochland, Hanover and Chesterfield. The county's contract with the city assures an available supply of 27 MGD. An average of 13.1 MGD of drinking water was received from the James River in 2002.

The Safe Drinking Water Act mandated that source-water assessments be performed by the Virginia Department of Health for all public water sources, including those serving Chesterfield County. The Department of Health conducted a source-water assessment of our system during 2001.

Swift Creek Reservoir, the James River and Lake Chesdin were determined to be of high susceptibility to contamination, using criteria developed by the state in its EPA-approved Source Water Assessment Program. The assessment reports consist of maps showing the source-water-assessment area, an inventory of known landuse activities of concern, and documentation of any known contamination within the last five years from the date of the assessment. These reports are available by contacting Wendy Harding, quality assurance coordinator, at (804) 744-1360, or Chesterfield Utilities at P.O. Box 608, Chesterfield, Va 23832.

Water quality samples are collected from Swift Creek Reservoir monthly by laboratory staff. Summary sheets presenting this information are available upon request from Wendy Harding by calling (804) 744-1360.

The Appomattox River Water Authority Continuous Turbidity Monitoring Violation

onventional water treatment plants are required to continuously monitor the filtered-water turbidity at each filter in order to ensure that the required levels of giardia and *Cryptosporidium* removal are achieved. From Dec. 6-17, 2002, the Appomattox River Water Authority experienced computer-related problems and did not provide continuous monitoring.

However, during this period the ARWA manually monitored samples from each filter hourly. The results of these samples complied with the filtered-water-turbidity levels required for surface-water plants. During this event, distribution-system monitoring showed adequate disinfection and the absence of bacteria.

Special Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791

Cryptosporidium, the most commonly used filtration methods cannot guarantee 100% removal. Monitoring of source water and/or finished water indicates the presence of these organisms. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease. Symptoms of infection include nausea, diarrhea, and abdominal cramps. Most healthy people can overcome the disease within a few weeks. However, immunocompromised people are at greater risk of developing life-threatening illness. We encourage immunocompromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water.

All three water sources serving Chesterfield County's system have been tested for *Cryptosporidium*. In 1998, monitoring indicated the presence of small numbers of particles that were the size and shape of *Cryptosporidium* in two of the three source waters – the James River and Lake Chesdin. The test results for all but one of the treated water samples were completely negative. One sample of the treated water from the ARWA indicated the presence of one particle the size and shape of *Cryptosporidium*. The particle was determined to be empty of internal cell structures and did not pose a health risk. The treatment process utilized by Chesterfield County, the City of Richmond and the ARWA includes filtration, which provides high-level protection against *Cryptosporidium*. However, since the finished water is not sterile, the absence of living *Cryptosporidium* cannot be guaranteed.

What's In My Water?

uring the past year, the water delivered to your home or business complied with, or exceeded all state and federal primary-drinking-water regulations. For your information, we have compiled a list in the table below showing what substances were detected in your drinking water during 2002. Although all of the substances listed below are under the Maximum Contaminant Level set by the EPA, we feel it is important that you know exactly what was detected and how much of the substance was present in the water. The state requires us to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

REGULATED SUB	STANCE	ES		AR	RWA	CITY OF RICHMOND		AEWPLF			
SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	MCLG	AMOUNT DETECTED	RANGE (LOW-HIGH)	AMOUNT	RANGE (LOW-HIGH)	AMOUNT DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Alpha emitters (pCi/L)	2002	15	0	ND	NA	0.3	0.3-0.3	0.2	0.2-0.2	No	Erosion of natural deposits
Atrazine (ppb)	2002	3	3	0.1	ND ¹ -0.1	ND	NA	ND	NA	No	Runoff from herbicide used on row crops
Beta/photon emitters (pCi/L) ²	2002	50	0	1.9	1.9-1.9	2.0	2.0-2.0	2.8	2.8-2.8	No	Decay of natural and man-made deposits
Chloramines (ppm) ³	2002	MRDL =4	MRDLG =4	4.2	0.98-4.2	4.9	1-4.9	3.5	1.3-3.5	No	Water additive used to control microbes
Chlorite (ppm)	2002	1	0.8	0.72	0-0.72	ND	NA	ND	NA	No	By-product of drinking water disinfection
Combined radium (pCi/L)	2002	5	0	0.6	0.6-0.6	0.2	0.2-0.2	0.3	0.3-0.3	No	Erosion of natural deposits
Fluoride (ppm)	2002	4	4	1.03	0.07-1.03	1.21	0.59-1.21	1.17	0.5-1.17	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Haloacetic Acids (HAAs) (ppb)	2002	60	NA	36.94	17-87	44.31	23-73	14.03	7.4-24	No	By-product of drinking water disinfection
Hexachlorocy- clopentadiene (ppb)	2002	50	50	0.1	ND ¹ -0.1	ND	NA	ND	NA	No	Discharge from chemical factories
Nitrate (ppm)	2002	10	10	ND	NA	0.31	0.31-0.31	ND	NA	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Simazine (ppb)	2002	4	4	0.08	ND ¹ -0.08	ND	NA	ND	NA	No	Herbicide runoff
TTHMs [Total Trihalomethanes] (ppb)	2002	80	0	69.56	39-150	36.69	26-48	30.94	20-53	No	By-product of drinking water disinfection
Total Coliforms (% positive samples)	2002	5% positive samples	0	2%	NA	2%	NA	ND	NA	No	Naturally present in the environment
Total Organic Carbon (Removal Ratio) ⁴	2002	TT	NA	1.10	1.01-1.29	1.4	0.9-1.8	1.26	0.88-1.46	No	Naturally present in the environment
Turbidity (NTU) ⁵	2002	ТТ	NA	0.9	NA	0.28	NA	0.14	NA	No	Soil runoff

Tap water samples were collected for lead and copper analyses from 16 homes throughout the service area

				A	RWA	CITY OF RICHMOND		AEWPLF			
SUBSTANCE (UNITS)	YEAR SAMPLED	AL	MCLG	AMOUNT DETECTED (90™%TILE)	HOMES ABOVE AL/TOTAL HOMES	AMOUNT DETECTED (90™%TILE)	HOMES ABOVE AL/TOTAL HOMES	AMOUNT DETECTED (90 TH %TILE)	HOMES ABOVE AL/TOTAL HOMES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2001	1.3	1.3	0.136	0	0.088	0	0.167	0	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb) ⁶	2001	15	0	ND	0	ND	1	2.9	0	No	Corrosion of household plumbing systems; Erosion of natural deposits

UNREGULATED SUBSTANCES	ARWA		CITY OF RICHMOND		AEWPLF			
SUBSTANCE (UNITS)	YEAR SAMPLED	AMOUNT DETECTED	RANGE (LOW-HIGH)	AMOUNT DETECTED	RANGE (LOW-HIGH)	AMOUNT DETECTED	RANGE (LOW-HIGH)	TYPICAL SOURCE
Bromodichloromethane (ppb)	2002	7.88	5-10	4.79	2.5-9.1	8.74	6.2-13	By-product of drinking water disinfection
Chlorodibromomethane (ppb)	2002	0.89	ND-1.7	0.5	ND-1.7	2.58	1.9-3.7	By-product of drinking water disinfection
Chloroform (ppb)	2002	58.12	34-140	31.25	23-42	19.63	12-36	By-product of drinking water disinfection
Metolachlor (ppb)	2002	1.2	ND-1.2	0.09	ND-0.09	ND	NA	Herbicide runoff
Sulfate (ppm)	2002	20.5	20.5-20.5	38.1	38.1-38.1	38.2	38.2-38.2	Erosion of natural deposits

Confirmation sampling did not detect this compound.

The MCL for Beta/photon emitters is written as 4 mrem/year. The EPA considers 50 pCi/L as the level of concern for beta emitters.

3Chloramines are regulated based on a running annual average of all measurements made. ARWA and City of Richmond chloramine levels met water quality standards.

*Total organic carbon results are given as removal ratios. Running annual averages equal to or greater than one meet water quality standards.

Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system. During the reporting year, a minimum of 100% of all samples taken to measure turbidity met water quality standards.

Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested and flush your tap for 30 seconds to 2 minutes before using tap water. Additional information is available from the Safe Drinking Water Hotline (800) 426-4791.

⁷This compound was detected in confirmation sampling.



Table Definitions

AL (Action Level): The concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.

NA: Not applicable

ND: Not detected

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water.

pCi/L (picocuries per liter): A measure of radioactivity.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

Removal Ratio: A ratio between the percentage a substance actually removed to the percentage of a substance required to be removed.

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.